Eastern Iowa Tillage and Manure Management, Crop Year 2002

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Manure, nitrogen (N) and phosphorus (P) management field demonstrations are used to promote refined manure and nutrient use by livestock and crop operations in the Maquoketa River watershed. Producers find confidence in these locally conducted field demonstrations because of similar soils, weather patterns and corn hybrids. Until crop year 2003, the majority of field demonstrations were located in the northern portion of the watershed. The Clinton County Soil and Water Conservation District (SWCD) wished to expand the field demonstration program to the southern reaches of the Maquoketa watershed and the adjacent Elk River watershed. Livestock and crop producers in these areas would also have locally-derived data to use during future crop nutrient input planning.

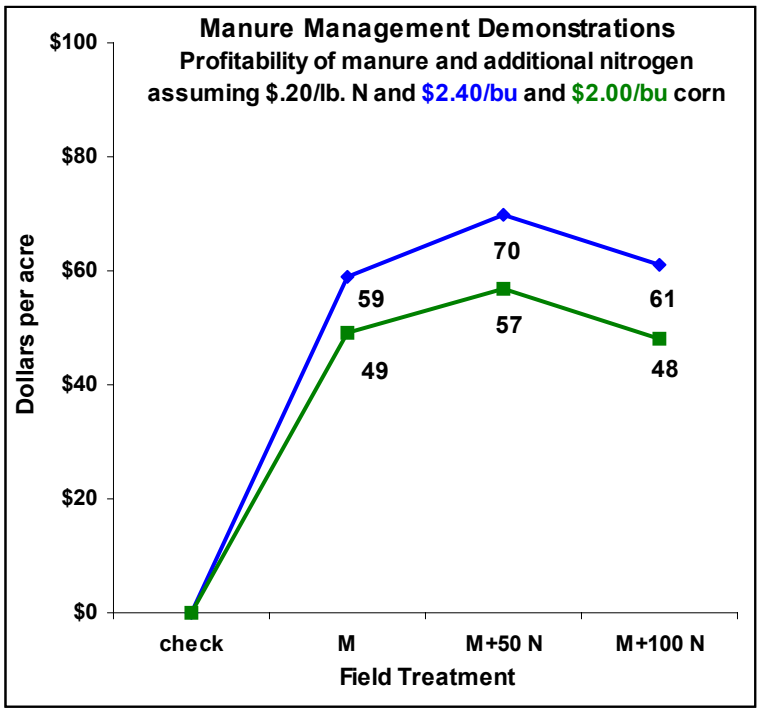
Twelve field demonstration sites were located in the Deep Creek and Elk River watersheds. The six manure management sites and six corn-following-soybean nitrogen and phosphorus management sites were identified and soil sampled following the 2001 harvest. Manure and phosphorus applications were replicated at each site during that fall. Nitrogen applications were made at planting time. To allow integration with other Maquoketa field demonstration data, the methods used at the demonstrations matched those conducted in the northern portion of the watershed during crop years 2000-02.

The manure management demonstrations involved producers applying solid cattle or swine manure at individual historic rates with their own equipment. The manure spreaders were calibrated and nutrient application rates were determined using manure analysis results from each location. On average, the manure supplied 84 pounds N per acre and 121 pounds P_20_5 per acre. The following treatments were included at each location: zero check, 100 N, MN rate, manure (M), M plus 50 N, M plus 100 N, 100 N plus 46 P, 100 N plus MP rate and manure plus 46 P. The "MN rate" and "MP rate" is commercial N and P applied at the same rate as the first-year crop-available N and P from the manure.

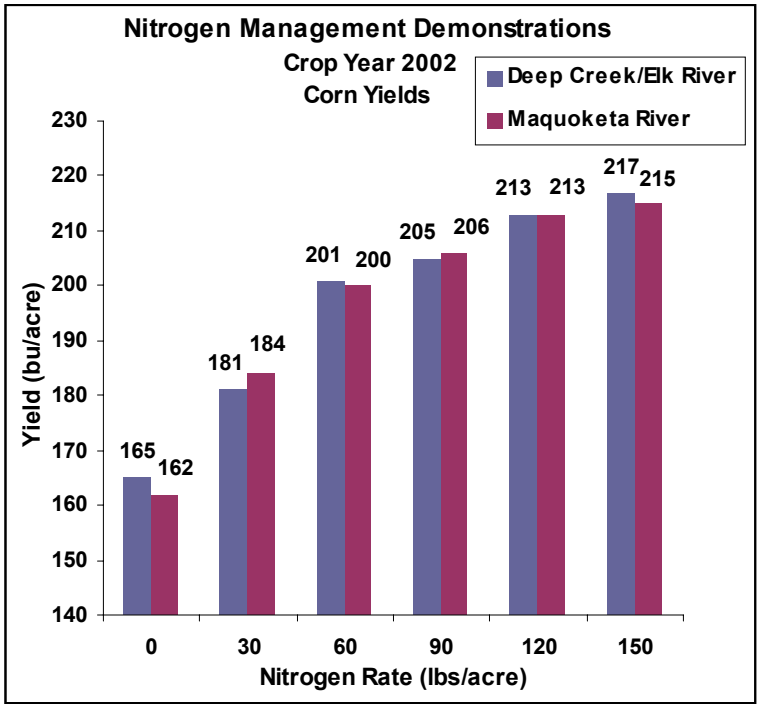
The corn-following-soybean demonstrations were fertilized with replicated N rates of zero, 30, 60, 90, 120 and 150 pounds N per acre. These sites also had replicated treatments of P_20_5 at zero, 46 (crop removal rate) and 92 pounds P per acre (two-year crop removal rate) in addition to 120 pounds N per acre.

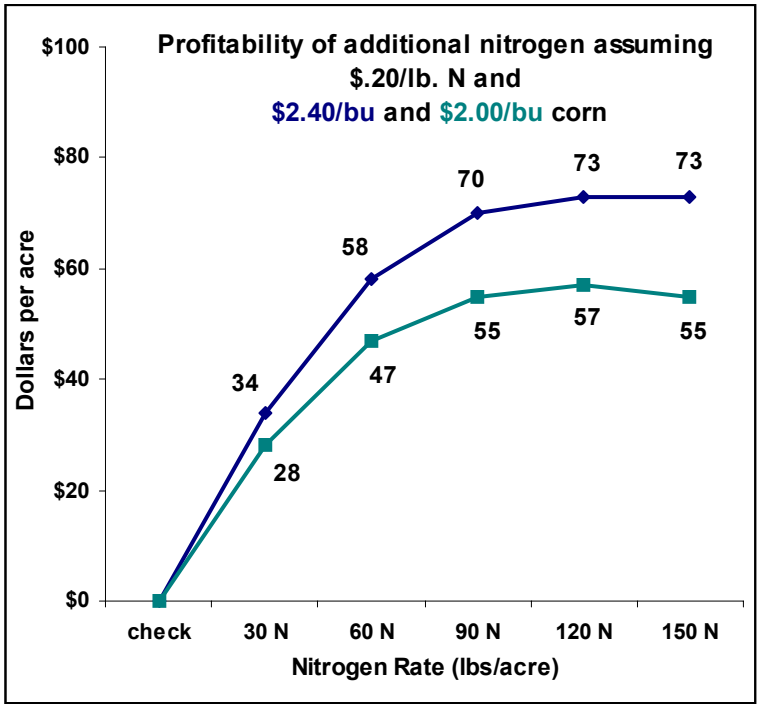
Measurements taken during the demonstration process included pre- and post-demonstration P soil test levels, late spring soil nitrate-nitrogen analysis, corn yield and end-of-season cornstalk nitrate-nitrogen analysis. The return on the N and P investment was calculated to determine which manure, nitrogen and phosphorus application rate is the most profitable for producers.

Yield results from the manure management field demonstrations show that the highest return to the N investment occurs when a moderate application of manure is supplemented with 50 pounds N per acre. The end-of-season cornstalk nitrate N was in the optimum range, 1,501 parts per million (ppm), indicating that the appropriate N rate was applied to provide the most profitable return. The optimum range for cornstalk nitrate is 700 to 2,000 ppm. Applying more than 50 pounds N to manured fields does not increase yield and actually reduces profitability.



The results of the corn-following-soybean demonstrations show that yields do not increase enough to pay for the additional N when N is applied at rates greater than 120 pounds per acre, when N is priced at $.20 per pound and corn is priced at $2.00 per bushel. When P is applied to high or very high P testing soil yield does not increase and corn value per acre is reduced by the cost of the fertilizer and application costs. Nearly ninety percent of demonstration fields test high or very high for soil P.





Promotion of the demonstration activities and dissemination of the results is done through *Water Watch*, a newsletter for the Maquoketa River watershed, watershed-wide media and individual contacts with producers.